भारतीय मानक
Indian Standard

IS 16342 : 2015
(Reaffirmed 2019)

भूकृत्रिम — भूवस्त्रादि की ब्रेकिंग लोड और दीर्घिकरण की परीक्षण विधि

Geosynthetics — Method of Test for Grab Breaking Load and Elongation of Geotextiles

ICS 59.080.70

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July 2015 **Price Group 2**

Geosynthetics Sectional Committee, TXD 30

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Geosynthetics Sectional Committee had been approved by the Textile Division Council.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

GEOSYNTHETICS — METHOD OF TEST FOR GRAB BREAKING LOAD AND ELONGATION OF GEOTEXTILES

1 SCOPE

1.1 This standard prescribes the test method to measure the breaking load (grab strength) and elongation (grab elongation) of geotextiles using grab method.

1.2 This test method may be used with constant-rate-of-transverse (CRT) or constant-rate-of-extension (CRE) type tension machines. However, there may be no overall correlation between the results obtained with the CRT machine and the CRE machine. Consequently, these two tension testers cannot be used interchangeably. In case of controversy, the CRE machine shall prevail.

2 REFERENCES

The standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

IS No.	*Title*
6359 : 1971	Method for conditioning of textiles
13321 (Part 1) : 1992	Glossary of terms for geosynthetics : Part 1 Terms used in materials and properties
SP 45 : 2014	Handbook on glossary of textile terms

3 TERMINOLOGY

For the purpose of this standard the definitions those given in SP 45 and IS13321 (Part 1) shall apply.

4 PRINCIPLE

It is the tension test in which only a part of the width of the specimen is gripped in the clamps. Specimen is subjected to continually increasing load in longitudinal direction of the specimen till the rupture of the specimen. The maximum force required to rupture the specimen is considered to be breaking load and elongation corresponding to the breaking load is elongation at break.

5 APPARATUS

5.1 Tensile testing machine, of the constant-rate-of-extension (CRE) or constant-rate-of-traverse (CRT) type with autographic recorder.

5.2 Clamps, having all griping surfaces parallel, flat, and capable of preventing slipping of the specimen during a test. Each clamp should have one jaw face measuring 25.4 mm × 50.8 mm, with the longer dimension parallel to the direction of application of the load. The other jaw face of each clamp be at least as large as its mate.

6 PREPARATION OF TEST SPECIMEN

6.1 Take the sample from a swatch extending in width of the fabric and approximately 1 m along the selvedge from each roll in the lot sample. Take a swatch such a way that fabric from the outer wrap of the roll or the inner wrap around the core is avoided.

6.2 Cut rectangular specimens of 101.6 mm × 203.2 mm in such a way that no specimens are taken nearer the selvedge or edge of the fabric than 1/20th of the fabric width or, 150 mm whichever is smaller. Cut a specimens to be used for the measurement of the grab strength in the machine direction (or warp yarns), with the longer dimension parallel to the machine direction (or warp yarns). Cut the specimens to be used for the measurement of the grab strength in the cross-machine direction (or weft yarns), with the longer dimension parallel to the cross-machine direction (or weft yarns).

6.3 The number of specimens shall be as agreed to between the buyer and the seller subject to a minimum of 5 in each direction.

7 CONDITIONING

7.1 Bring the specimens to moisture equilibrium in the atmosphere for testing textiles as specified in IS 6359.

7.2 Specimens to be tested in the wet condition shall be immersed in water maintained at a temperature of 27 ± 2°C. The time of immersion shall be sufficient to wet-out the specimens thoroughly, as indicated by no significant change in strength or elongation following a longer period of immersion, and at least 2 min. To obtain thorough wetting, it may be necessary or advisable to add not more than 0.05 percent of a nonionic neutral wetting agent to the water.

8 PROCEDURE

8.1 Test the conditioned specimens in the standard atmosphere for testing as defined in IS 6359.

8.2 Set the distance between the clamps at the start of the test at 75 ± 1 mm. Select the load range of the testing machine such that the maximum load occurs between 20 to 80 percent of full-scale load. Set the machine to operate at a speed of 300 ± 10 mm/min.

8.3 Secure the specimen in the clamps of the testing machine, taking care that the long dimension is as nearly as possible parallel to the direction of application of the load. Be sure that the tension in the specimen is uniform across the clamped width. Insert the specimen in the clamps so that approximately the same length of fabric extends beyond the jaw at each end. Locate the jaws centrally in the widthwise direction by having the line which was drawn 37 mm from the edge of the specimen run adjacent to the side of the upper and lower front jaws which are nearest this edge. This ensures that the same lengthwise yarns are gripped in both clamps.

8.4 Start the tensile machine and continue until the rupture occurs. Note down the maximum load required to rupture the specimen and corresponding elongation.

8.5 If a fabric slips in the jaws or if 25 percent or more of the specimens break at a point within 5 mm of the edge of the jaw, then (a) the jaws may be padded; (b) the fabric may be coated under the jaw face area; or (c) jaw face may be modified. If any of the modification method above is adopted then it should be specified in report.

8.6 If individual test result deviates 25 percent or more from the average test result of a swatch, it shall be discarded and an additional specimen tested. Calculate the average excluding outlier values.

9 CALCULATION

9.1 Calculate the average value of all breaking load for all accepted specimen results. Breaking load shall be separately determined for the machine direction and cross machine direction specimens.

9.2 Calculate the average value of elongation at corresponding breaking load for all the specimens. Elongation for the machine direction specimen and cross machine direction specimen should be determined separately. Elongation should be expressed as the percentage increase in length, based upon the initial nominal gauge length of the specimen.

10 REPORT

The report shall include the following:

a) State that the tests were performed as directed in this test method. Describe the material(s) or products (s) sampled and the method of sampling used.

b) Report the following information for each sample:

    1) The average grab breaking load for specimens cut in each direction, for all specimens giving acceptable breaks.

    2) The average elongation for specimen cut in each direction.

    3) Number of specimens tested for each specimen.

    4) Type of padding used in jaws, modification method used should be specified.

    5) Any modification of sample specimens as manufactured, or test method as described.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Geosynthetics Sectional Committee, TX 30

Organization	*Representative(s)*
The Bombay Textile Research Association, Mumbai	Dr A. N. Desai (***Chairman***) Shri V. K. Patil (*Alternate*)
Business Coordination House, New Delhi	Shri Samir Gupta Shrimati Ritika Gupta (*Alternate*)
Central Road Research Institute, New Delhi	Shri Sudhir Mathur Shri Jai Bahagwan (*Alternate*)
Central Soil and Materials Research Station, New Delhi	Shri Nripendra Kumar Shri Manish Gupta (*Alternate*)
CIDCO, Mumbai	Representative
Coir Board, Kochi	Dr U. S. Sarma Shri M. Kumaraswamy Pillay (*Alternate*)
Department of Jute and Fibre Technology, Kolkatta	Dr Swapan Ghosh Shri K. R. Gupta (*Alternate*)
Directorate General of Supplies and Disposals, New Delhi	Additional Director General (QA)
E. I. Dupont India Pvt Ltd, Gurgaon	Shri R. Ganesh Shrimati Vedika Kapoor (*Alternate*)
Ganga Flood Control Commission, Patna	Shri S. Masood Husain Shri Ravi Bhushan Kumar (*Alternate*)
Garware Wall Ropes Ltd, Pune	Shri Tirumal Kulkarni Shri S. J. Chitnis (*Alternate*)
Gujarat Engineering Research Institute, Vadodara	Shri L. V. Ashara Research Officer (*Alternate)*
Indian Jute Industries' Research Association, Kolkata	Shri P. K. Choudhury Shri Koushik Das (*Alternate*)
Indian Jute Manufacture Association, Kolkatta	Representative
Jaya Shree Textiles, Hooghly	Shri Pawan Sharma
Kusumgar Corporates, Mumbai	Shri Y. K. Kusumgar Dr M. K. Talukdar (*Alternate*)
Macaferri Environmental Solutions Pvt Ltd, Navi Mumbai	Dr Ratnakar Mahajan
Maharashtra Maritime Board, Mumbai	Representative
National Highways Authority of India, New Delhi	Shri R. K. Gandhi Shri R. P. Singh (*Alternate*)
National Jute Board, Kolkatta	Shri T. Sanyal Shri A. K. Khastagir (*Alternate*)
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Premier Polyfilms Ltd, Ghaziabad	Dr Sanjeev K. Verma Shri Harinder Kumar (*Alternate*)
Reliance Industries Ltd, New Delhi	Shri M. S. Verma Shri V. Ravikanth (*Alternate*)
Strata Geosystems (I) Pvt Ltd, Mumbai	Shri Narendra Dalmia Shri Shahrokh Bagli (*Alternate*)
Supreme Nonwovens Pvt Ltd, Hyderabad	Shri C. K. Chaudhuri Shri C. K. Jain (*Alternate*)
Techfab India, Mumbai	Shri Anant Kanoi Dr Saurabh Vyas (*Alternate*)

Organization	*Representative(s)*
The Synthetics & Art Silk Mills Research Association, Mumbai	Dr Manisha Mathur Shrimati Ashwini Sudam (*Alternate*)
Urja Products Pvt Ltd, Ahmedabad	Shri Janak Nanavaty
Veermata Jijabai Technological Institute, Mumbai	Shri S. P. Borkar
BIS Directorate General	Shri Prabhakar Rai, Scientist ‘E’ and Head (TXD) [Representing Director General (*Ex-officio*)]

Member Secretary
Shri J. K. Gupta
Scientist ‘C’ (TXD), BIS

Bureau of Indian Standards

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